

TYPHOON FAYE

Typhoon Faye, the seventh typhoon of the 1978 season, was one of the most interesting, but unfortunately, also one of the year's most difficult typhoons to forecast. Besides executing an uncommon anticyclonic loop early in her development, Faye also unexpectedly reintensified to typhoon strength shortly before becoming extratropical.

The tropical disturbance that was to become Typhoon Faye was first sighted southeast of Ponape at 242142Z, August 1978 by satellite reconnaissance. The disturbance moved west-northwest at 13 kt (24 km/hr) and at 261200Z passed north of Truk. During this period, 200 mb analyses showed a tropical upper tropospheric trough (TUTT) with an imbedded low northwest of the disturbance. This TUTT moved west-northwest in conjunction with the surface circulation thereby keeping excellent upper-level outflow in the diffluent region, southeast of the TUTT cell, over the developing tropical disturbance.

Based on an improved satellite signature and on ship synoptic data, a Tropical Cyclone Formation Alert was issued on the disturbance at 272334Z. Shortly thereafter, a reconnaissance aircraft confirmed the existence of a closed surface circulation with a minimum sea level pressure of 1000 mb. Based on this aircraft data, the disturbance was upgraded to Tropical Depression 16 at 280000Z with max winds of 30 kt (15 m/sec). The 500 mb subtropical ridge axis was at that time oriented east-west along 36N.

At 280600Z, TD-16 passed 60 nm (111 km) to the northeast of Guam and was upgraded to Tropical Storm Faye six hours later. During the next 24 hours the storm moved straight north while slowly intensifying. The 500 mb flow pattern became complex during this period due to the influence of two new developing tropical systems: TS Gloria between Luzon and Japan and TS Hester west of Marcus Island (Fig. 3-13). The 500 mb analysis at 281200Z (Fig. 3-14) showed that the Pacific Ocean south of Japan between Guam and the Philippine Islands was dominated by an elongated monsoon trough holding multiple circulation centers, one of which was to become TS Gloria. High pressure cells were located east of Tokyo and southeast of Marcus Island.

The 281200Z objective steering aids indicated Faye would track northeastward. However, because the initial pattern itself was confused, a more climatological north-northwestward track was forecast.

By 291200Z Faye began to execute a rare, anticyclonic loop. The 300000Z, 500 mb analysis (Fig. 3-15) showed that Faye was now positioned between two high pressure centers: one located between Marcus Island and the Volcano Islands, and the other located south of Guam. This pattern was the result of the combined influence of Gloria, Hester, Faye, and a long-wave, mid-level trough that was developing far to the northeast of Faye. It was now possible for Faye to choose one of

two routes: (1) move north-northeast in the weakness between Marcus Island and Wake Island; or (2) move west-northwest along the southern periphery of the high pressure center to her north.

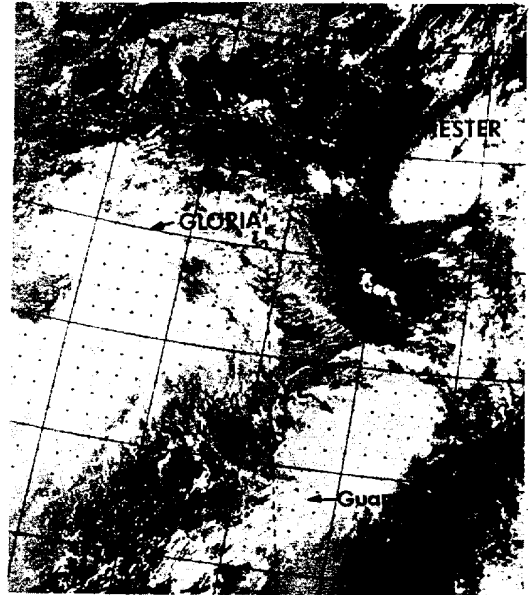
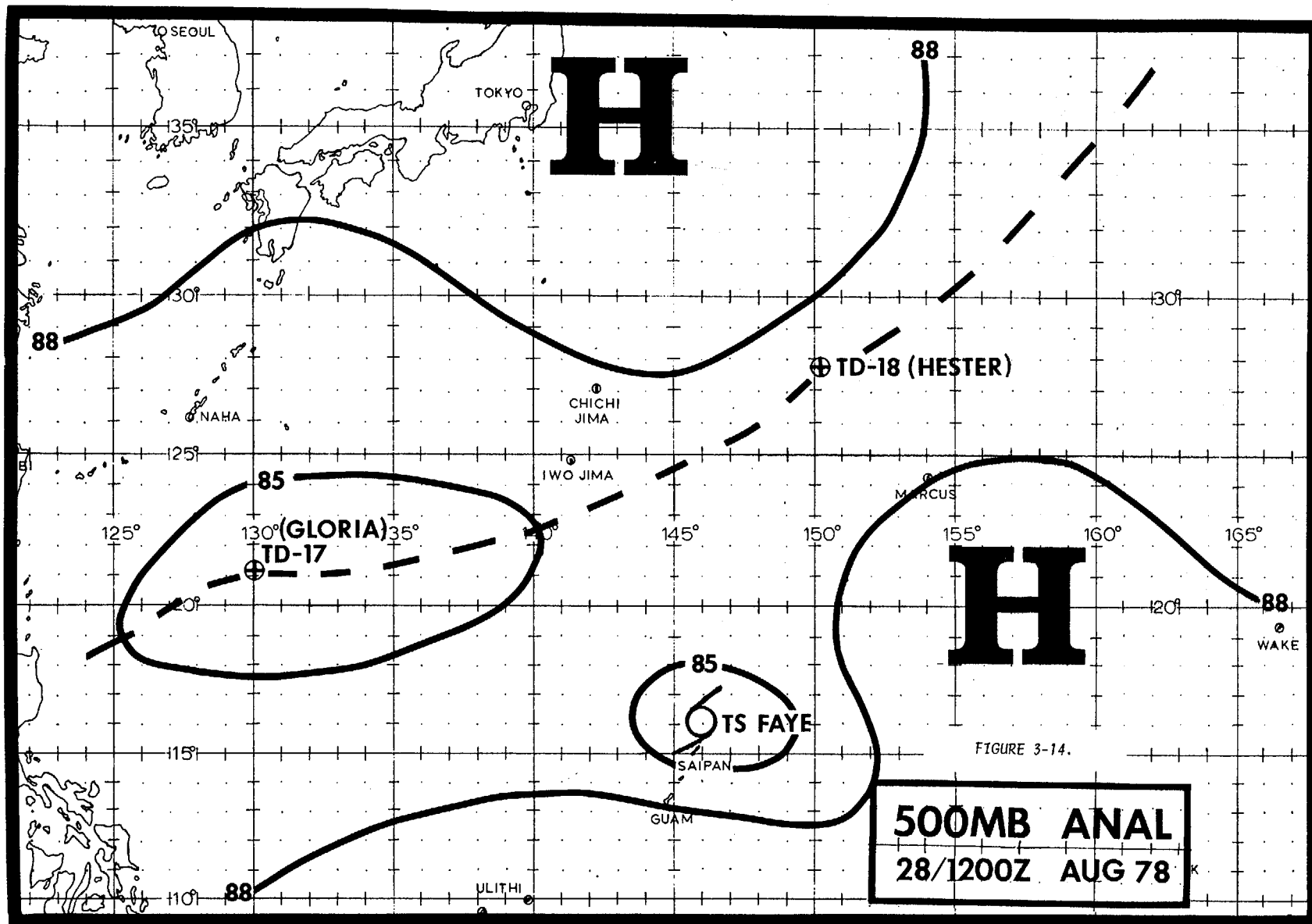


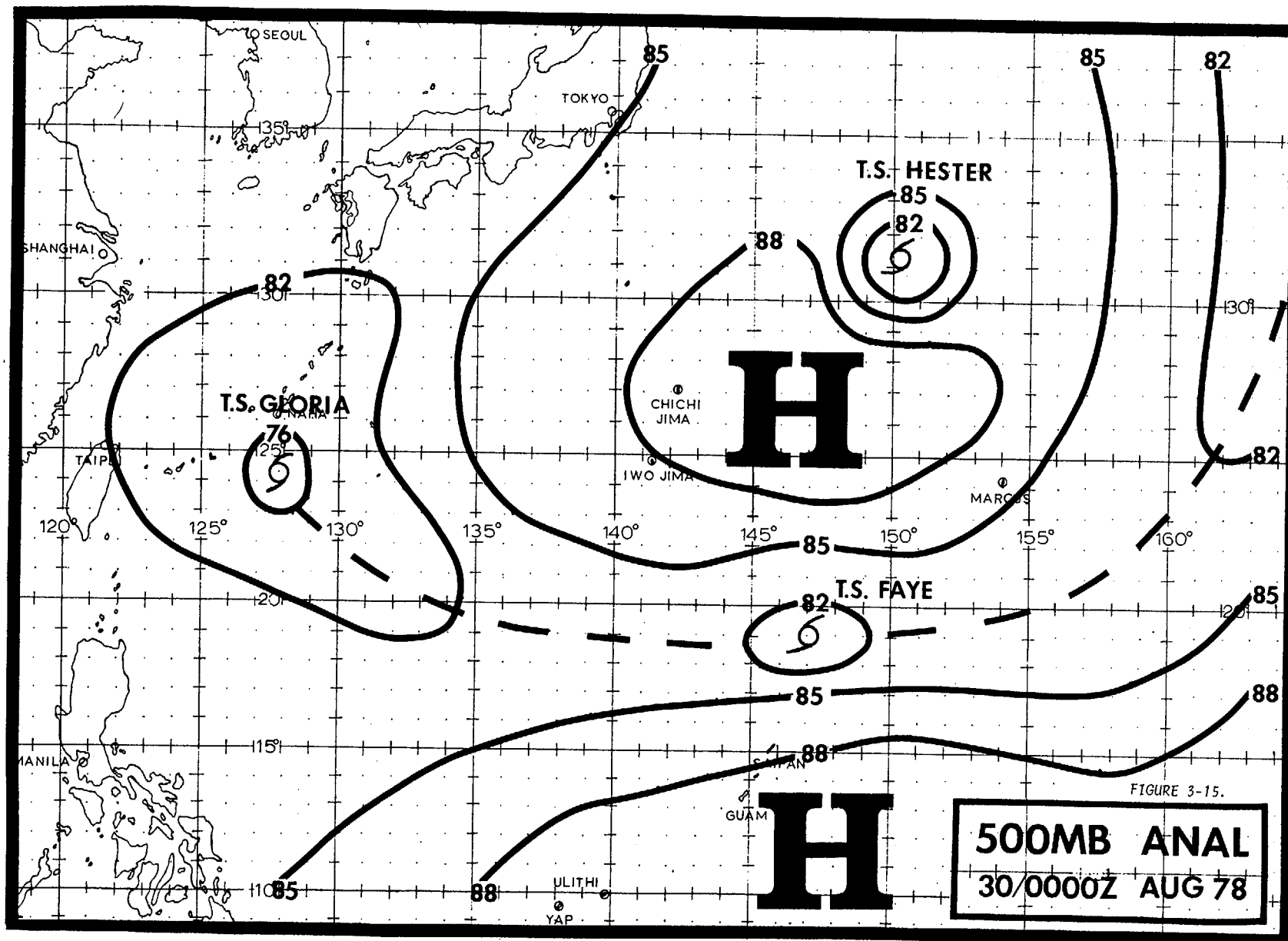
FIGURE 3-13. Tropical Storm Faye just prior to executing an anticyclonic loop north of Guam, while at an intensity of 40 kt (21 m/sec). TS Gloria is southeast of Okinawa and TS Hester is northwest of Marcus Island, 29 August 1978, 0137Z. (DMSP imagery)

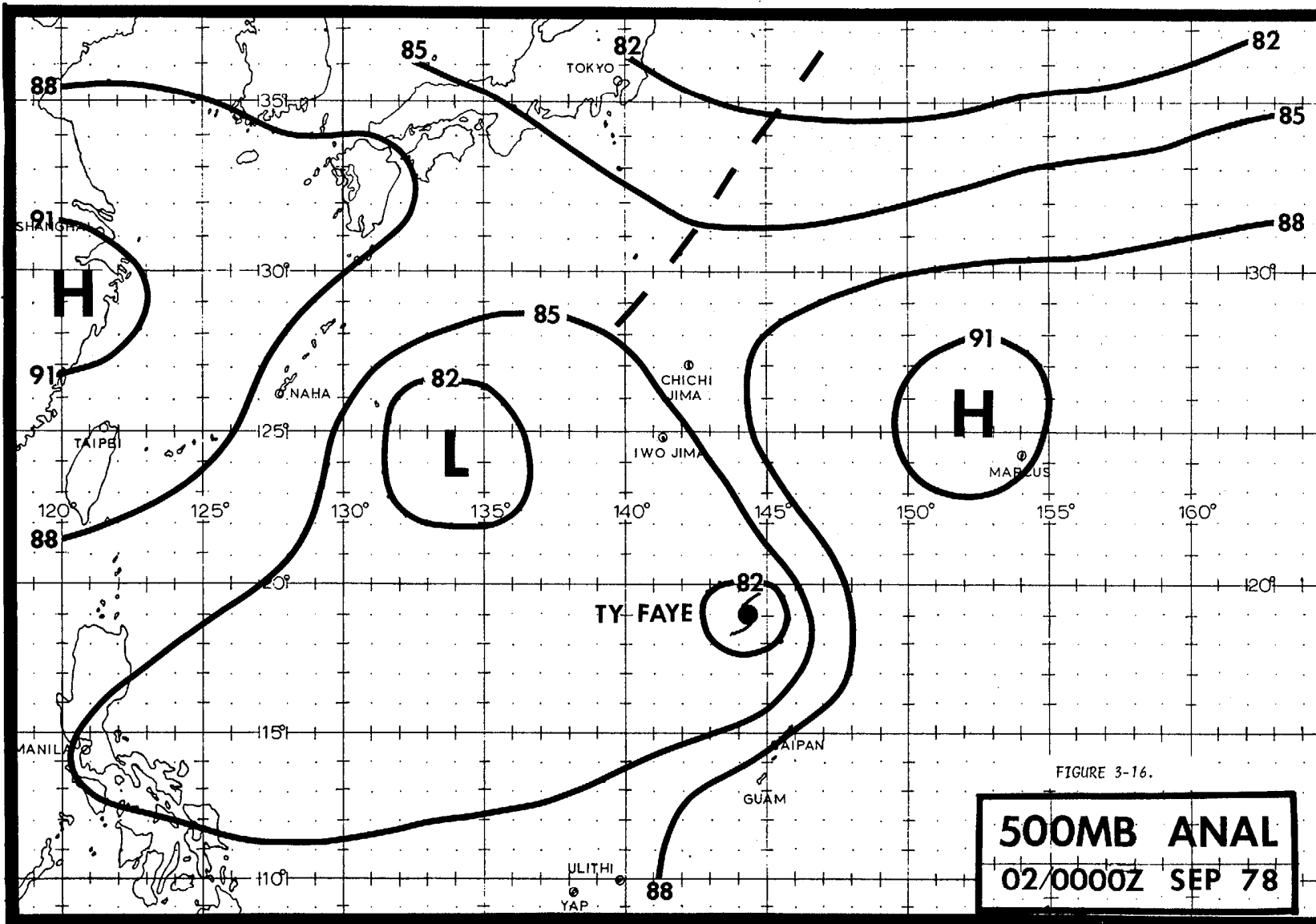
Unfortunately, by 310000Z, the high pressure center south of Guam shifted further to the west. This change in the flow pattern allowed Faye to swing to the south and thus complete her anticyclonic loop.

Faye reached the southernmost point of her looping track at 010000Z September and six hours later was upgraded to typhoon strength based upon the development of a poorly defined eye and a central pressure drop to 984 mb as reported by reconnaissance aircraft. At 020000Z September, the 500 mb pattern again changed radically (Fig. 3-16). Ridging, albeit weak, now dominated the Pacific east of Faye. Troughing, enhanced by a long wave east of Japan dominated the Pacific west of Typhoon Faye. Faye was now under the influence of southeasterly steering flow and began tracking steadily north-westward around the western periphery of the ridge.

As the ridge strengthened, Faye accelerated from 8 kt (15 km/hr) to 16 kt (30 km/hr) by 031200Z. Thereafter she began to decelerate again and weaken as she approached the axis of the mid-tropospheric subtropical ridge. By 041800Z, Faye







weakened to tropical storm strength and within six hours had crossed the ridge axis and began to recurve to the northeast.

Normally a system would be expected to accelerate after crossing the ridge axis, but in this case the mid-latitude westerly jet stream was located considerably to the north; the mid-level steering was therefore very weak and Faye actually continued a slowing trend. Likewise, a tropical system would be expected to continue weakening after recurvature as it moves over cooler water, begins to entrain cold air at mid-levels from the north and comes under the influence of strong vertical wind shear. A reconnaissance aircraft at 050541Z, however, reported that Faye's central pressure had dropped to 975 mb with an increase in overall organization also noted. Faye was upgraded to typhoon strength based on aircraft reconnaissance and ship data at 051800Z.

The reason for Faye's reintensification was related to the weak, upper-level flow pattern. During Faye's period of reintensification, mid- and upper-level winds were

basically zonal and light, thereby minimizing the cold air entrainment. Reconnaissance aircraft reports indicated that Faye was distinctly warm core during this period. Because of the weak flow between 500 and 200 mb, vertical wind shear was small and, thus, Faye was able to maintain vertical organization longer than was anticipated.

By 061200Z September, Faye again weakened to tropical storm intensity due to increasing vertical wind shear. Upper-level winds increased and satellite imagery showed that her upper-level center was finally being sheared off from the surface center. The final warning on TS Faye was issued at 071800Z at which time she was fully extratropical and in the process of merging with the polar front.

Although Typhoon Faye avoided the major land masses of the Pacific area, she did cause damage to the Northern Mariana Islands. During her anticyclonic loop, the islands of Agrihan, Alamagan, and Pagan were directly affected twice. Pagan sustained the most damage with sixty-five homes destroyed and one merchant vessel grounded.